

News, Views & EE**Science**

Disclaimer: this monthly update is intended for internal distribution within the Earth and Environmental Sciences Division at Los Alamos National Laboratory and must not be distributed outside of LANL.

Safety

A Message from Jeff

Jeff Hansen, Division ES&H Officer,
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Hazard Control Plans (HCPs) and Integrated Work Documents (IWDs)

Several people have asked about this “new” HCP/IWD process. One question was: Do all HCPs need to be converted to IWDs? The answer is: the **HCPs remain with us as is; only the IWD needs to be developed.** The current HCP process remains the only way that line managers in EES Division may authorize work and workers to precede with work.

The next question I have had is: Do all HCPs need to have the IWD part finished, walked-down, and signed before January 1, 2004? The answer is: No, not all work, only that work that is expected to be performed as of January 1, 2004. New work or work to be done later in the year can wait until the work is to be done. Each group has declared what HCPs will need IWDs before 1/1/2004. Some have already begun to postpone some of the document preparation to later in the year because the work is not needed yet.

The IWD process has a web page:
<http://int.lanl.gov/safety/iwmc/>

The process is beginning to take hold and various EES division personnel are being

included in other division’s work process, DX and ESA divisions to name a few. RRES will probably be next. This will make collaborative work somewhat more complicated for paperwork but the documentation will call out exactly who is the responsible division leader and who is in charge of the work. We are allowed to develop long-term work but the daily execution of the paperwork will be with us for a while.

Look over the web page; the FAQ section in the upper right has a lot of information.

Security

An Ear on the LIR from Tony

Tony Montoya, Acting Division Security Officer (DSO), 7-8065, antonio@lanl.gov

Computer Usage Registration

Heads up: DOE orders have mandated new descriptions for the sensitivity of data relating to computer usage. Because the descriptions are now different, **your old registration will no longer be valid.** You will have to register again once this is announced.

Once this new registration process is ready, you will have approximately a month or two to register.

It is critical that you understand this registration will be linked to the training data base (just like the badge readers) and if you are not registered, you will not have access to badge readers and it will even disable your Crypto Card so that you will not be able to enter even your Time and Effort, etc.

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- A Rock Solid Message from Terry Wallace

Craig and I wish **all** of you a safe and happy holiday season! Enjoy your families and friends, and above all, rest and try to reduce your **stress** during the break (if you have any?)!

Dollar\$ and \$ense New\$

Please refer to Jeff Heikoop's SELT news below. Hopefully, by early next year we should have some news on our funding and programmatic activities.

Service Anniversaries & Congratulations to the Following

Gary Langhorst, **EES-2, 25 years**
Alan Mitchell, **EES-7, 25 years**
Brent Newman, **EES-2, 15 years**
Hari Viswanathan, **EES-6, 5 years**

News from the Science and Engineering Leadership Team

Jeff Heikoop, Chair,
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The SELT's activities in December have focused on the LDRD process. We met with Howard Hanson on December 1st to discuss issues surrounding the LDRD-ER competition. Many issues were addressed and SELT

provided constructive feedback, which will be followed up in writing as a memo routed through the Division Office.

On December 15th SELT reviewed LDRD-DR pre-proposals and developed feedback to provide to the PIs. Eight pre-proposals representing a diverse array of topics have been received. SELT has also been active in helping to identify and encourage nominees for LDRD committees at the DR and ER level. We encourage EES staff to participate in this process in order to increase EES Division's chances of success. SELT's focus will remain on LDRD in the coming new year. We will continue to work with PIs to improve LDRD-DR pre-proposals and we will host an LDRD-ER forum on February 2nd.

Best wishes for a happy holiday season!

Weekly Highlights / Accomplishments sent to ADSR

Los Alamos Successfully Defends ARMANDO Experiment

On November 18th, **Thomas Kunkle and Christopher Bradley** of the Geophysics Group in the Earth and Environmental Sciences Division at Los Alamos successfully defended the containment plan for the ARMANDO sub-critical experiment to the Containment Review Panel (CRP); the plan is to be executed in March of 2004. There were very few comments or additions to the Los Alamos plan recommended by the CRP that is important for containing special nuclear materials in Los Alamos' stockpile stewardship experiments.

Fehler Named to Earthscope Panel

Dr. Michael Fehler of the Earth and Environmental Sciences Division at Los Alamos was recently appointed to serve on the Downhole

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Monitoring technical panel for the San Andreas Fault Observatory at Depth, a component of EARTHSOPE, which was recently funded through the National Science Foundation. Dr. Fehler joins other panel members representing several universities, Chevron/Texaco, and Japan. The web site for Earthscope is: <http://www.earthscope.org/safod/>

<http://www.earthscope.org/index.html>

DOE Encourages Drillers to Think Small

The December 2003 issue of EXPLORER, published by the American Association of Petroleum Geologists, an international organization, features a comprehensive article on Los Alamos' microhole drilling technology using coiled tubing systems. Microhole technology is exclusively a Los Alamos development. The article states, "The impetus for microhole technology was the constantly shrinking economic viability of testing downhole tools in standard sized wells, according to **James Albright** with the Los Alamos National Laboratory." Dr. Albright is a researcher in the Earth and Environmental Sciences Division's Geophysics Group. Albright also states, "We realized we needed to look at drilling fit-for-purpose holes. This has been an evolutionary versus revolutionary journey. If we had been forced to start with a revolutionary new drilling system based on new physics with an entirely new infrastructure the idea may have died on the vine. But we have been able to adapt existing technology."

In April 2003, under DOE's sponsorship, Los Alamos microhole researchers organized a petroleum industry workshop to gather input on microhole technology; the workshop brought in 63 representatives from industry, government, and laboratories to identify the primary potential applications for microhole technology in an effort to focus new research in this area.

Earth and Environmental Sciences Well Represented at AGU

The American Geophysical Union (AGU) is holding its Fall 2003 Conference in San Francisco, California, from December 8 – 12. The conference attracts scientists from across the nation and the world. The Earth and Environmental Sciences Division (EES) at Los Alamos is always well represented both presiding over sessions and making presentations in the majority of all sessions. A few selected highlights of the EES presentations at the conference include the following:

EES Personnel Presiding over Sessions:

Novel Ways of Analyzing the Seismic Coda II

Presiding: R Snieder, Center for Wave Phenomena/Colorado School of Mines;
Michael Fehler, Los Alamos National Laboratory, Earth and Environmental Sciences Division.

Novel Ways of Analyzing the Seismic Coda III

Presiding: R Snieder, Center for Wave Phenomena/Colorado School of Mines;
Michael Fehler, Los Alamos National Laboratory, Earth and Environmental Sciences Division.

Earthquake Location: Applications and Developments of New Techniques II

Presiding: **Charlotte Rowe**, Los Alamos National Laboratory, Earth and Environmental Sciences Division; D R Shelly, Stanford University.

Earthquake Location: Applications and Developments of New Techniques III

Presiding: **Charlotte Rowe**, Los Alamos National Laboratory, Earth and Environmen-

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tal Sciences Division; D R Shelly, Stanford University.

Geologic History of Volcanic Regions II

Presiding **Fraser Goff**, Los Alamos National Laboratory, Earth and Environmental Sciences Division

Selected **Presentations** by EES personnel:

Evolving Earth Models and Nuclear Explosion Monitoring

Terry Wallace, Jr.

Cosmic-ray Ionization Current to Ground And Its Impact on The Global Circuit

Jonah Colman
Robert Roussel-Dupre

Deuterium Enrichment in Atmospheric Molecular Hydrogen and the Global Isotopic Budget

Thom Rahn

Seasonal Variation in the Carbon Isotope Ratio of Ecosystem Respiration in Two Coniferous Forests

Nathan McDowell

Application of Local Surface Matching to Multi-Date ALSM Data for Improved Calculation of Flood-Driven Sediment Deposition and Erosion

Cathy Wilson

The Role of Micromixing in Reactive Transport in Groundwater: Theory and Field Applications

Bruce Robinson
Hari Viswanathan

Estimating aquifer properties using time-lapse, high precision gravity surveys and groundwater modeling

Elizabeth Keating
Allen Cogbill

Predicting the Surface Redistribution of Possibly Contaminated Tephra Deposits at the Yucca Mountain Repository Using Cesium-137

Chuck Harrington

Investigating the use of Three-dimensional Travel-time Tables for Standard Regional Seismic Event Relocation

Mike Begnaud
Charlotte Rowe
Lee Steck
Chris Bradley
Claudia Aprea

Can Chabazite Account for the Water Observed on the Equator of Mars?

Bill Carey
Claire Fialips

Deciphering Metamorphic Processes Through 3D Visualization of Thermal and Textural Modeling

Carl Gable
Bryan Travis

Migration of conservative and sorbing radionuclides in heterogeneous fractured rock aquifers at the Nevada Test Site

Andy Wolfsberg
Jennifer Boryta

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Vadose-Zone Fluid and Solute Flux in Deep Arid Systems at the Nevada Test Site: Modeling the Effects of Climate Change, Plant-Soil Interactions, and Material Heterogeneity

Andy Wolfsberg
Phil Stauffer

Read more @

http://ees.lanl.gov/archive_index/agu_2003.shtml

<http://www.agu.org/meetings/fm03/waisfm03.html>

Goff and Valentine Invited Participants at Penrose Conference

Fraser Goff and Greg Valentine, researchers in the Earth and Environmental Sciences Division, are participants in a Penrose Conference (sponsored by the Geological Society of America) to be held near Puebla, Mexico January 12-16, 2004. The focus of the conference is Neogene-Quaternary continental margin volcanism, with sessions ranging from basic volcanological research to prediction of hazards on affected populations.

Goff is a co-convenor and panelist for the session "Gas compositions and flux measurements at Popocatepetl, Mexico, 1994-1998." He will discuss his research on the application of remote sensing techniques to measuring gas emissions from Popocatepetl volcano's recent period of activity.

Valentine is a panelist for a session titled, "Explosive silicic volcanism and sedimentation processes." He will discuss research associated with the triggering of large eruptions that result in caldera collapse.

Read more @

<http://tepetl.igeofcu.unam.mx/penrose/index.html>

Mystery Image Winner for
November:

It was **Redondo Peak** in the Jemez!

1st Place: **Phil Stauffer**, EES-6

2nd Place: **Jeff Heikoop**, EES-6

3rd Place: **Jamie Gardner**, EES-9



Photo above: **Courtesy of Fraser Goff**

Roughly 1.25 million years ago, a huge volcanic eruption showered a thick layer of ash and debris over northern New Mexico, smothering everything it landed on and transforming the landscape forever. Today, Los Alamos scientists are digging into the remains of that explosion to understand the **sleeping giant** in our backyards, the **Valles Caldera** in the Jemez Mountains.

More than 100 times the size of the 1980 Mount St. Helen's eruption, the blast gave birth to a world-class caldera: the Valles Caldera. Its footprint includes the remains of

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more than a dozen separate volcanic episodes. One of these episodes produced an eruption rivaling the one that buried Pompeii in 79 AD. Now set aside as a national trust, the caldera is an exceptional geologic resource that Los Alamos scientists are using to evaluate and predict volcanic hazards.

Redondo Peak is a post caldera uplift (a combination of rubble and magma that pushed up through the caldera floor.) Redondo Peak is not a volcano; however, it was formed from volcanic rocks that were uplifted from the caldera.

Dottie's
Mystery Image for **D**ecember:



- Is this **Fenton Hill Site** in the Jemez?
- Is this **Copar Pumice mine** in the Jemez?
- Is this **Fenton Lake** in the Jemez?

Respond to: dot@lanl.gov

Next month the Mystery Image Prize is revealed!!

EEScience

Guest Editorial

Challenges for Enterprise GIS

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Marc S. Witkowski, EES-9, and
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(based on Los Alamos Report LA-13930-MS)

Summary

Despite rapid growth in the use of geographical information system (GIS) technologies in public and private organizations, recent advances in data storage, processing, and networking do not necessarily result in increased data accessibility. With the goal of enhanced geospatial data sharing within and across organizational boundaries, organizations increasingly focus on enterprise, or institutional, solutions to effective information exchange, thereby avoiding redundant systems and services and incompatible infrastructure (Keating et al. 2002, 2003, Witkowski et al. 2003). Though most current efforts focus primarily on data sharing issues, enterprise GIS can also include shared infrastructure and analysis resources. Enterprise GIS is a virtual rallying call.

The evolution of data management in large organizations typically follows a “punctuated equilibrium” model (Gould and Eldredge 1977), in which the status quo limits growth or change until the system is disturbed and then rapid change occurs, followed by a new status quo. Such a disturbance may come in

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the form of a natural or man-made disaster, during which urgency demands action, the limitations of the existing system are exposed, and necessity opens the door for change. In the aftermath of the destructive May 2000 Cerro Grande wildfire (Mynard et al. 2003), GIS and information management (IM) experts at Los Alamos National Laboratory (LANL) are considering options for improved geospatial data management and information exchange, based on lessons learned during and shortly after the fire.

Jack Dangermond, CEO of ESRI, Inc. expounds five elements for success of enterprise GIS: 1) attain management support, 2) develop a plan, 3) be customer focused, 4) ensure in-house “ownership” for the process, and 5) build a “team of two” of technical expertise and management support to make enterprise GIS a reality. The key to success is the development of a sound geospatial information management plan. Like any business plan, the geospatial information management plan must be financially viable and technically sound. The plan should address five aspects: 1) design specification, 2) resource evaluation, 3) logical design, 4) physical design, and 5) implementation. The scope of the implementation plan encompasses tasks, methods, and activities; a schedule; funding sources; and organizational responsibilities (Witkowski et al. 2003). A complete geospatial data cycle provides an overarching design framework (Figure 1).

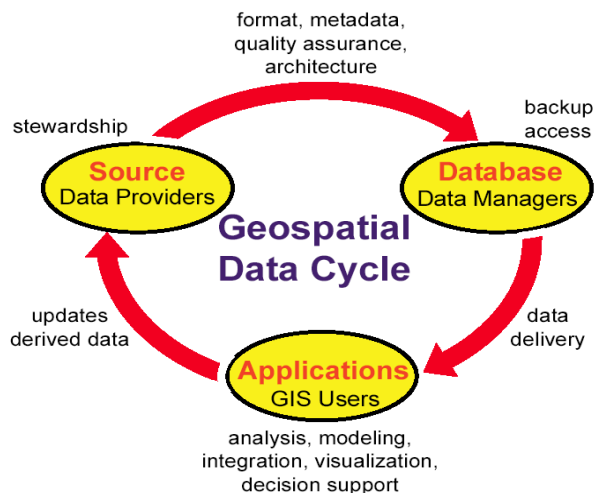


Figure 1. A complete geospatial data cycle includes a full constellation of necessary steps in the flow of data from source to database to applications, and includes feedback in the form of updates and derived data.

At LANL, as in many large institutions, the level of expertise of individual staff and the capabilities of project teams are high. Because of the large size and long time frame of various projects, there is also significant GIS infrastructure in place in the form of hardware, commercial software licenses, and custom software applications. There is typically good informal communication among GIS experts in the institution as a result of ongoing collaborations. In general, small teams of GIS professionals throughout LANL work well internally and meet project needs within the scope of individual projects and organizational mandates. However, at the larger level of the institution as a whole, the geospatial data cycle (Figure 1) is broken, and GIS coordination is difficult. The translation from small, semi-independent GIS teams to an institutional, enterprise GIS involves many challenges, including duplication of facilities, lack of coordination, incompatible data format and architecture, inconsistent quality assurance and change control, and lack of data protection.

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Enterprise GIS is a natural result of the evolution in geospatial data sharing within institutions, but this change can be painful. A part of evolution is resistance to change, and this is manifested in unique ways at each institution. This resistance is affected by different stakeholder roles and stereotypes (e.g., operations vs. research). In addition, the typically excellent working relations among GIS professionals at the grass-roots level can be limited by organizational divides. In the final analysis, an enterprise GIS design for any large organization must meet the needs and missions of a broad spectrum of stakeholders; the challenge lies in striking a balance in the degree of centralized storage, administration, and procedural control while serving the needs of the GIS community for streamlined data documentation, access, and compatibility.

There is a clear need for efficient data sharing and enterprise-wide data standards, but complete centralization of geospatial (and much tabular) data may not be in the best interests of the diverse GIS stakeholders. The metadata clearinghouse must be constructed and populated, per Executive Order 12906, as updated in OMB Circular A-16, and standards for data quality, format, access and documentation must be enforced by a cross-organizational body such as the recently created LANL GIS Steering Committees. While many individual data sets can reside with the data owners, the existence, status, and access mechanism must be made known. Certain core data of near-universal utility, such as infrastructure, topography, and orthophotography, should be placed in a central repository with adequate change control and data currency administration. Implementation of an institutional solution to enterprise GIS requires slightly greater burden on individual GIS users, but the value in efficient data sharing far outweighs the extra work, especially as stakeholders adopt sound information management and business practices.

The transition from numerous small, semi-independent GIS teams to an integrated, institutional GIS poses many challenges, but the benefits promise to be huge.

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